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ABSTRACT

A study examined the extent to which international agricultural dimensions were taught in secondary agricultural programs and factors associated with the extent of integration. A systematic sampling technique was used to select a random sample of 332 of the 2,612 secondary agricultural teachers in 12 states of the North Central United States. Of 231 responses, 220 (66%) were usable. Overall, 58% of the teachers reported teaching international agricultural concepts in their classes. Ohio ranked first with respect to extent of integration, followed by Wisconsin. Minnesota ranked 12th. Nearly 92% of the respondents expressed a high degree of awareness about cultural differences among people, and more than 83% expressed positive attitudes toward integrating international agricultural concepts into their program. Older teachers, teachers perceiving strong school administration support for internationalizing the agricultural curriculum, and teachers exhibiting higher degrees of cultural awareness were most likely to integrate international agricultural concepts into their courses. It was recommended that school authorities support internationalization of the agricultural sciences curriculum by providing instructional materials and necessary information on international agriculture and that agricultural teachers familiarize themselves with and actively participate in internationally focused activities to enhance their cultural and global awareness. (Contains 26 references.) (MN)

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Summary of Research

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The Integration of International Agricultural Concepts into Agricultural Science Programs in the North Central Region of the United States

Don O. Ibezim and J. David McCracken

Global education has been defined as a process that provides students and individuals with knowledge, skills and attitudes necessary for them to meet their responsibilities as citizens of their community, state, and nation in an increasingly interdependent and complex global society (Florida Task Force, 1982). The development of agricultural industry in any country is inextricably linked to changes in global economy and education. The mission of agricultural education in the United States is to foster the development of knowledge and skills related to the industry of agriculture (National Task Force, 1987). To compete effectively in the ever changing international labor force, agriculturally educated individuals must understand the global nature of agricultural industry and its effects on United States domestic food production, distribution and consumption. In 1988, the National Research Council recommended that the dominance of local production agriculture in the curriculum must be broadened to include global concepts on utilization of agricultural commodities, agriscience marketing and management. The implementation of this recommendation requires a major change in the agricultural curriculum at the secondary level. This curriculum change will require teachers who are committed to internationalizing their agricultural programs.

One major challenge to agricultural educators in the next decade will be how to address the issue of the growing complexity in global interdependence (McCracken, 1990). The Commission on Global Education (1987) reported that schools were not responding fully to the need to educate students for citizenship, nor were they recognizing the global demands which would be expected of U.S citizens in the future. The National Research Council (1988) observed that agricultural education in U.S secondary schools usually does not extend beyond the offering of a vocational agriculture program, which has resulted in a steady decline in student enrollment over the past ten years. According to Hemp (1980), the practice of basing agriculture courses of study entirely on local farm practice and preparing students for employment in the local community is no longer a defensible approach to the

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development of agricultural education programs in secondary schools. Domestic agriculture curriculum alone can no longer hold students interest nor substantially attract new enrollment in agriculture classes. White (1990) noted that internationalizing agricultural education sparked students interest, revitalized agricultural education programs, and most importantly, provided students with a more complete picture of agricultural education.

Related Literature

Davis (1989) reported that teachers were interested in infusing international agricultural concepts into their curriculum, but were at a loss about what to teach. Teachers also lacked the knowledge base to make such instruction relevant. Successful implementation of international agriculture would require both affective and behavioral changes in individual teachers involved in the integration of global perspectives.

Educators who were involved in international programs tended to have a more positive attitude about international educational programs (Reaman & Etling, 1990), and were more likely to integrate international concepts into their curricula than those without such experience (Peuse & Swanson, 1980; Reisch, 1989). Reisch further stated that the key elements related to internationalization of the agricultural curriculum in primary and secondary schools were teachers' knowledge of international aspects and an awareness of global interdependence and cultures of other people.

Plomp and Carleer (1986) conceptualized three sets of variables influencing implementation of educational innovations. The first set of variables is foundational. This set includes: school, state and teacher support, favorable teacher attitude and sufficient teacher experience. The second set of variables which are of special importance at the beginning of the innovation includes: teachers' knowledge of the topics, collegial interaction among teachers, in-service training, and availability of material resources. Teachers participation and initiative, deliberation structure, and planning constitute the third variable set which is very relevant for the continuation of the innovation implementation process.

Fullan (1982) indicated that active administrative commitment and leadership at the school level, quality and frequency of collegial interaction among educators, and the availability of validated resource materials are necessary for successful implementation of an educational innovation. Fullan concluded that the more teachers experience the rewards of interaction the more they will use the criterion of professional contact and development as a means to become more involved in educational innovation. Teachers participation in in-service workshops on development of educational innovation has been found to be related to integration of the innovation (Darr, 1985; Pepple, 1986, McKeown, 1990). Pierce (1981) reported that young teachers with higher levels of formal education are more likely to implement educational innovation.

Teachers of agriculture have a responsibility to present educational materials from a perspective which explicitly takes into account the international dimensions of agriculture (Kellogg, 1984). Agricultural teachers have demonstrated favorable attitude toward international agricultural program (Hossain, & Moore, 1992; Ludwig, 1991). However, high school students continue to have a limited awareness of international concepts (McCracken, 1990; Harbstreit & Welton, 1992).

This study determined the extent to which international agricultural concepts

were taught in secondary schools, and the factors influencing teachers efforts to implement the innovation. Information derived from this study would be helpful in planing and developing support programs and activities for agricultural educators involved in internationalizing their agricultural instruction.

Purpose and Objectives

The purpose of the study was to investigate the extent to which international agricultural dimensions were taught in secondary agricultural programs and determine the factors associated with the extent of integration. Specific objectives of the study were:

1. Describe the extent to which international agricultural concepts were taught in secondary agricultural education programs in the North Central Region of the United States.

2. Determine the relationship between the extent of integration of international agricultural concepts and selected demographic variables of the teachers: age, tenure, level of education, and school location.

3. Determine the relationship between the extent of integration of international agricultural concepts and international experience variables: knowledge of international agriculture, in-service workshop, international travel and cultural awareness.

4. Determine the relationship between the extent of integration of international agricultural concepts and work-related variables: attitude towards international agriculture, commitments by; state, school and teachers, sources of information and resource utilized.

Procedures

A descriptive research design with a correlational component was utilized for the study. Relationships among naturally occurring phenomena were examined without intervention. Correlational research identifies and describes relationships among natural occurring phenomena (Fraenkel & Wallen, 1990), and it is useful in predicting from one variable to another (Ary, Jacob & Razavich, 1985).

The population was the secondary school agricultural teachers in the twelve states of the North Central Region: Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. There were 2,612 secondary agricultural teachers in the population identified from the *Agricultural Educators Directory* for the 1991-92 academic year. A systematic sampling method with a random start was utilized to draw a representative sample of 332 agricultural teachers from the population (Krejcie & Morgan, 1970). A sampling interval of eight was determined by dividing the population size by the required sample size. Every eighth secondary school agricultural teacher listed in the directory was drawn with a random start of four. The systematic sampling technique enhanced the control of sampling error. Fowler (1988) indicated that systematic sampling yields a precision equivalent to a simple random sample, but possesses the benefits of a stratified random sampling. There was a 95% probability of a sampling error of less than plus or minus 5% from population parameters.

The researchers developed the survey instrument. The questionnaire was divided into four parts. Part one of the instrument measured the extent to which international agricultural concepts were taught in

secondary agricultural classes. Part two consisted of these variables: knowledge of international agriculture, participation in internationalization workshops, international travel and cultural awareness. Part three assessed teachers' work-related characteristics: attitude towards international agriculture, commitments by the state, school and teachers, sources of information and instructional resources utilized. Part four collected demographic information. Likert-type summated scales were developed to measure the extent of integration, cultural awareness, attitude toward international agriculture, and institutional commitments. Teachers knowledge of international agriculture was measured by a series of true or false cognitive statements drawn from various international agricultural dimensions. Content validity was established by a panel of experts consisting of graduate students and faculty members in agricultural education. Twenty agricultural teacher from the population who did not participate in the study were used for pilot test. Cronbach's alpha was used as a measure of internal consistency for the various scales. Reliability coefficients ranged from .63 to .94.

A questionnaire packet with cover letter was mailed to the 332 randomly selected secondary agricultural teachers in Spring, 1992. After the initial and follow-up mailing and a postcard reminder, a 15% random sample of non-respondent was interviewed. Comparisons were made between respondents and non-respondents, and between early and late respondents. There were no statistical significant differences between either of the groups. The overall response rate was 70% (n=231), however, only 66% (n=220) of the responses were usable.

Data were analysis with the Statistical Packages for Social Sciences (SPSS/PC+) at The Ohio State University, Department of Agricultural Education. Descriptive statistics consisting of frequencies, means, percentages and standard deviations were calculated for all the variables. Pearson-product moment correlation coefficient and Kendall's Tau were used to determine the relationships between variables. Semi-partial multiple regression coefficient were calculated to determine the proportion of variance in the dependent variable, extent of integration of international concepts, uniquely attributable to each of the three variable sets. Stepwise regression analysis was used to identify specific independent variables which contributed to the teachers' extent of integration of international concepts scores.

Findings

Demographic Variables

Sixty-four percent of the secondary agricultural teachers had taught agriculture for over 10 years. Ninety-four percent were male and 6% were female. The mean age of the teachers was 35 years. Seventy percent of the agricultural teachers teach in schools located in rural areas. Fifty percent of the teachers had earned master's degrees while 46% had Bachelor degrees. One percent had obtained an associate degree as the highest college degree, and 2% had doctoral degrees.

Extent of Integration

Nine different international agricultural dimensions suggested by McCracken and Magisos (1989), and the National Task Force (1987), were used to measure the extent of integration of international concepts. Overall, 58% of the teachers reported they taught international agricultural concepts in their classes. Table 1 shows the

Table 1

Rank Order and Mean Scores Reflecting the Extent of Integration of International Agricultural Dimensions (n=220)

International Agricultural Dimensions	Rank	Mean	S. D.
Origin of Crops	1	3.2	1.1
Agricultural Technology	2	2.9	1.0
Agricultural Trade	3	2.9	1.1
Geographical Factors	4	2.9	1.2
Economic Factors	5	2.8	1.0
Political Factors	6	2.8	1.1
Consumption of Food and Fiber	7	2.7	1.0
Cultural Factors	8	2.4	0.9
Agricultural Practice	9	2.2	0.9

Measured on a 5 point scale; 1=never, 2=really, 3=sometimes, 4=frequently, 5=always.
Overall Mean=2.74, Standard Deviation=.67.

rank order and mean scores reflecting the extent to which various international agricultural dimensions were taught in the secondary schools agricultural classes. The six most integrated international dimensions in secondary agricultural classes were: the origin of crops, agricultural technology, agricultural trade, and geographical, economic and political factors. Agricultural practice was the least taught international dimension. The overall mean score on the extent of integration was 2.74, and the standard deviation .67. Of all the twelve states sampled in the study, Ohio ranked first on the extent of integration with a mean score of 2.91, followed by Wisconsin at 2.90. Minnesota ranked 12th with a mean score of 2.34. The states of Ohio, Wisconsin, Missouri, Illinois, Indiana, and Kansas scored above the overall mean of 2.74, while Michigan, South Dakota, North Dakota, Iowa, Nebraska, and Minnesota scored below the overall mean.

International Experience

Large proportion (84%) of the teachers have not participated in any in-service workshop on international agriculture, while 16% reported they have attended at least one in-service workshop on international agriculture. Most of the workshops were organized by the respective state universities. Eighty five percent of the teachers had been to other countries, mostly in Europe, South and North America, for military service and educational reasons.

Teachers knowledge on international agricultural concepts was measured by a series of dichotomous (true or false) statements using five different dimensions of international agriculture. Over 88% of the teachers identified the correct statements on agricultural technology dimension, 77% for agricultural trade, 70% for agricultural practice, 52% for food and fiber consumed in other countries, and 49% for origin crop dimensions. Almost 92% of the respondents expressed a high degree of awareness about cultural differences among people.

Work-Related Characteristics

Over 83% of the teachers expressed positive attitudes toward integrating international agricultural concepts into their agricultural program. The overall mean

Table 2

Resources on International Agriculture Used by the Teachers (n=220)

Resources Utilized	Rank	Mean*	S.D
Visual Material	1	2.76	1.00
Resource People	2	2.67	1.00
Basic Curriculum Guide	3	2.00	1.00
Student Activities	4	1.50	.91

* Measured on a 5-point scale. 1=never, 2=rarely, 3=sometimes, 4=frequently, 5=always.

score for this construct was 4.47 on a 6-point Likert scale (1=strongly disagree, 6=strongly agree) with a standard deviation of .66. Eighty percent of the teachers indicated they were committed to making their agricultural program more internationally focused. Overall, the respondents agreed that the state department of education and school administration should be actively committed to internationalization of secondary agricultural curricula. The mean scores for teacher commitment was 4.39, state department of education commitment (mean=4.71), school commitment (mean=1.25) and principal commitment was 1.31 (on a 6-point Likert scale, 1=strongly disagree, 6=strongly agree).

On a 5-point scale (1=never, 5=always), the mean scores for utilization of selected instructional materials ranged from 2.76 for visual materials (slides, video tapes) on international agriculture to 1.50 for student activities on global perspectives (Table 2). On an instrument continuum of 1 (little importance) to 6 (highly important), teachers rated text/reference books as a highly important source for obtaining information about international agriculture with a mean score of 4.0. Mass media, curriculum material services and individual contact with other teachers received a mean score rating of 3.9 as a highly important source of information for international agriculture (Table 3). It is inter-

Table 3

Sources of Information about International Agriculture Used by Agricultural Teachers

Information Sources	n	Mean*	S.D
Text/Reference Books.	219	4.0	1.15
In-service Workshop.	220	4.0	1.40
Mass Media.	220	3.9	1.13
Curriculum Material Services.	219	3.9	1.28
Other Teachers.	220	3.9	1.31
Cooperative Extension.	220	3.7	1.26
State Dept. of Education.	220	3.6	1.38
Agriculture Expt. Station.	220	3.3	1.34
National Task Force on International Agriculture.	220	3.0	1,36

* Measured on scale of 1 to 6, (1 = "of little importance") (6 = "highly important")

esting to note that many teachers rated the Cooperative Extension Service (mean=3.7) above their State Department of Education (mean=3.6) and the National Task Force on International Agriculture (Mean 3.0) as an "important" source of information for inter

Exploration of Relationships Between Variables

Low positive relationships, significant at the .05 level, were found between extent of integration and the number of years teachers taught agriculture (r=.15), age of teacher (r=.11), and level of formal education (r=.17). Teachers school location (urban or rural) was unrelated with the extent of integration of international concepts.

Examination of the relationships between the extent of integration and teachers' knowledge on international agriculture dimensions revealed that only the knowledge of food and fibre consumed in other countries was related with the dependent variable (r=.12). A low positive relationship was also found between cultural awareness and extent of integration (r=.23). Participation in internationalization workshops, and international travel were not related to the extent of integration.

Low to moderate statistical positive relationships were found between extent of integration and the following work-related variables: the teachers attitude towards international agriculture (r=.27), teacher commitment (r=.14), perceived state department of education commitment (r=.11), and perceived school commitment (r=.29). There was no significant relationship between extent of integration and principal commitment (Tables 4, 5 and 6). Teachers having a greater extent of integration of international concepts tended to use the following sources of information: Cooperative Extension Service (Tau=.15), mass media (Tau=.24), text and reference books (Tau=.17), curriculum material services (Tau=.23), and personal contact with other teachers (Tau=.24) (Table 5). Other sources of information: agricultural experiment station, state department of education, in-service workshops and the National Task Force on International Agriculture were unrelated to the extent of integration of

Table 4

Relationships Between Extent of Integration and Work-Related Variables (n=220)

	Attitude	Teacher Commitment	State Commitment	School Commitment	Principal Commitment
Attitude towards international agriculture	1.00				
Teacher commitment	.41**	1.00			
State commitment	.40**	.36**	1.00		
School commitment	.39**	.21**	.25**	1.00	
Principal commitment	.07	-.08	-.05	.18*	1.00
Extent of integration	.27**	.14*	.11*	.29**	.04

* p<.05, ** p<.001

Table 5

Relationships Between the Extent of Integration and Sources of Information

Sources of Information	Tau Coefficients	n
Mass Media	.24**	220
Contact with other Teachers	.24**	220
Curriculum Material Services	.23**	219
Text/Reference Books	.17*	219
Cooperative Extension	.15*	220
Agriculture Exp. Station	.13	220
State Dept. of Education	.07	220
In-Service Workshops	.07	220
National Task Force	.06	220

* p<.05, **p<.001, n=sample size.

international concepts. Teachers with greater extent of integration of international concepts tended to utilize the following instructional resource materials in teaching their agriculture classes: visual materials (films, video tapes) (Tau=.34) and resource people (Tau=.32) on international agriculture, basic curriculum guides on international agriculture (Tau=.25) and student activities on global perspectives (Tau=.16) (Table 6).

Regression Analysis

A semi-partial multiple regression analysis was calculated to determine the amount of variance explained in the extent of integration score by the three sets of independent variables. The three demographic variables, the two international experience variables, and the thirteen work-related variables that were related to the extent of integration comprised the variable sets. Table 7 indicates that the demographic and work-related variable sets explained a unique portion of variance in the dependent variable. The total R^2 was .40.

A stepwise multiple regression analysis was performed to determine the proportion of variance in the dependent variable "extent of integration" that was explained by the linear combination of the independent variables (Table 8). The following

Table 6

Relationships Between Extent of Integration and Resources Utilized by Agricultural Teachers

Resources Utilized	Tau Coefficients	n
Mass Media	.24**	220
Visual Material	.34**	220
Resource People	.32**	220
Basic Curriculum Guide	.25**	220
Student Activities	.16*	220

* p<.05, ** p<.001, n=sample size.

Table 7

Semi-Partial Multiple Regression Coefficient for the Independent Variable Sets (N=220)

Variable Sets	KA	KB	sR2	F
Demographic Variables	15	3	.024	2.67*
International Experience	16	2	.014	2.35
Work-Related Variables	5	13	.279	7.12**

R2 =.40, *p<.05, **p<.001, (df 18, 199). KA = # of variables controlled.
KB = # of variables in the set.

variables were found to be the best predictors of the extent of integration of international concepts: visual materials on international agriculture and basic international agriculture curriculum guide as the most utilized instructional resource materials, attitude towards international agriculture, level of formal education, and mass media as a highly important source of information. As a group, these five variables explained 35.5% of the variance in extent of integration of international concepts.

Conclusions

The extent of integration of international agricultural concepts in the secondary schools is less than desired. In addition to the quantitative data, teachers were asked to provide their comments concerning the internationalization of secondary agricultural curriculum. Many teachers provided both positive and negative comments. Some teachers felt that a better job of preparing students with non-agricultural backgrounds for agricultural jobs should have a priority over internationalizing the curriculum. Others felt that the current curriculum was already too packed with material to add something additional. The nature of the favorable comments was that internationalizing the curriculum would assist in expanding the base of interested students, in assisting future agriculturalists expand agricultural exports, and in preparing students for global careers.

Table 8

Stepwise Multiple Regression Scores on Significant Independent Variables (N=220)

Independent Variables	Multiple R	R^2	R^2 Change	F
Visual Materials X_1	.465	.217	.217	28.68**
Attitude X_2	.514	.265	.048	11.07**
Basic Curriculum Guide X_3	.559	.304	.040	12.94**
Mass Media X_4	.579	.335	.031	10.37**
Level of Education X_5	.594	.353	.018	5.95*

* p<.05, **p<.001

The multiple regression equation with the respective calculated regression weights (B's) and intercepts (A) is: $Y = .32x_1 + .19x_2 + .21x_3 + .18x_4 + .14x_5 + .453$

Findings of this research were generally consistent with previous research on the adoption of educational concepts, and innovations. However, there was one notable exception. Older teachers were more likely to adopt the internationalization of their curricula than were younger teachers. It may be that awareness of and interest in global agriculture increases with age to the extent that older and more experienced teachers are more apt to work this new era into their curricula.

Teachers perceiving strong school administration support for internationalizing the curriculum were more likely to adopt this curriculum change. It appears that school administrators have a strong influence on curriculum initiative and can influence innovation with necessary leadership activities.

Teachers' attitudes toward integration of international concepts may predispose the extent to which they integrate international agricultural dimensions in their classes. It appears that agricultural teachers who exhibit higher degrees of cultural awareness would be more likely to internationalize their agricultural instruction. Conversely, teachers who lack awareness of other peoples' culture may not be interested or may even resist internationalizing their agricultural instruction.

Based on the findings of this research, the following variables appear to be the most significant factors contributing to the extent of integration of international concepts: utilizing visual materials (slides, video tapes) on international agriculture, attitude towards international agriculture, utilizing basic international agriculture curriculum guides, mass media as an important source of information, and level of formal education.

Recommendations

1. The school authorities should influence the integration of international concepts initiatives with necessary leadership activities such as: provision of instructional materials and access to necessary information on international agriculture, and suggestions for change in curriculum priorities.

2. Agricultural teachers must actively participate in and familiarize themselves with various internationally focused activities to enhance their cultural and global agriculture awareness.

3. Schools should develop multi-cultural programs and activities to better expose agricultural teachers and their students to different cultural values. International students in state universities should be routinely invited during agricultural classes to speak about their country's agricultural systems.

4. Creative support programs and activities on global agriculture should be developed to attract the participation of older and experienced teachers in the innovation integration process.

5. Further research is recommended to develop and test curriculum materials, prioritized possible curriculum content, establish justification for a global dimension in agricultural occupations, and determine the interest and knowledge of agricultural students about international concepts.

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SUMMARY OF RESEARCH

To compete effectively in the ever changing international labor force, agriculturally educated individuals must understand the global nature of the agricultural industry and its effects on United States domestic food production, distribution, and consumption. This study investigated the extent to which international agricultural concepts are taught in secondary schools, and the factors influencing teachers efforts to implement the innovation. This study should be of interest to agricultural educators who are internationalizing their agricultural instruction.

This summary is based on a dissertation by Don O. Ibezim under the direction of J. David McCracken. Don O. Ibezim was a graduate student in the Department of Agricultural Education at The Ohio State University. He is currently Program Coordinator, Office of Retention Services, The Ohio State University. Dr. McCracken is a Professor, Department of Agricultural Education, The Ohio State University. Special appreciation is due to Martin McMillion, Virginia Polytechnic Institute and State University; Bryan Garten, University of Missouri; Edna L. McBreen, West Virginia University; and Joseph A. Gliem, The Ohio State University.

Research has been an important function of the Department of Agricultural Education since it was established in 1917. Research conducted by the Department has generally been in the form of graduate theses, staff studies, and funded research. It is the purpose of this series to make useful knowledge from such research available to practitioners in the profession. Individuals desiring additional information on this topic should examine the references cited.

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